

# MOTOROLA

## Service Manual

AUTO RADIO

MODEL  
CTA6T

### GENERAL INFORMATION

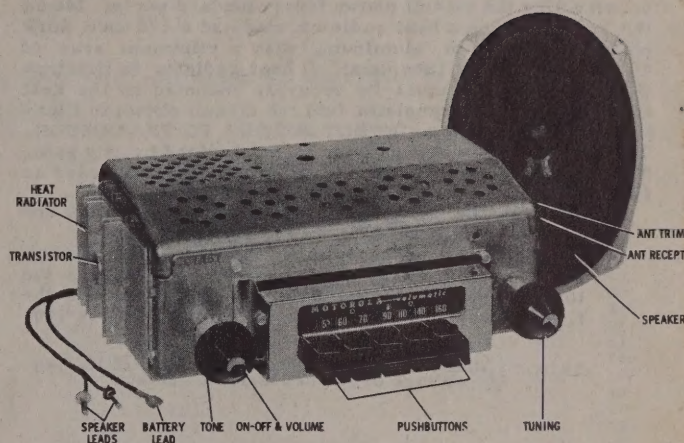
**TYPE** - Automotive type superheterodyne receiver with transistor output and 5 miniature tubes. Plate power is furnished directly by car storage battery. This model is designed for custom in-dash installation in the 1956 and 1955 Chevrolet cars.

**TUNING RANGE** - Broadcast 540 to 1600 Kc IF - 455 Kc

**OPERATES FROM** - 12 volt storage battery  
Rating - 1.75 amps. at 14 volts DC

**POWER OUTPUT** - 2.5 watts undistorted; 4 watts at 10% distortion.

**TUBE COMPLEMENT** - 12AC6 RF amp., 12AD6 conv., 12AC6 IF amp., 12F8 Det-AVC-AF amp., 12K5 driver, 2N176 or 2N177 or 2N178 transistor pwr amp.



### TO SET PUSHBUTTONS

This receiver has an automatic tuner with 5 pushbuttons for automatic station selection.

To set the pushbuttons for automatic tuning, proceed as follows:

1. Tune in the desired station with the manual tuning knob.

Tune carefully until you are exactly on the station.

2. Pull out the first pushbutton to be set, to unlock the button for station set-up, and then push button in firmly to set and lock the button.

3. Follow the above procedure for the remaining four buttons.

### MOTOROLA AUTO RADIO WARRANTY SERVICE PROCEDURE FOR BRANDED MODELS

1. The definition of a Motorola Branded Model is one that is branded with the Motorola name, and distributed to dealers through authorized Motorola Distributors.

2. Before performing a warranty repair on a Motorola Branded Auto Radio, you must first receive from the customer the Customer's Warranty Policy. This policy must be filled out by the selling dealer at the time of retail purchase. The Customer's Warranty Policy must show the radio to be within the ninety day warranty period if the repair is to be handled under the Motorola Auto Radio Warranty Plan.

3. The removal or reinstallation of the radio, the elimination of motor noise, tire static, electrical interference, or faulty installation and aerial repairs are not considered as warranty repairs. Consequently, charges for these services are to be borne by the customer.

4. Fill in the Motorola Auto Radio Warranty Labor Claim, Part No. 54P480884, and mail White and Green copies to the Motorola Distributor serving your area. The Yellow copy is to be retained by the Warranty Service Station for his files.

5. Defective parts for warranty repairs made on Motorola Branded Auto Radios are to be sent to your Motorola Distributor for free replacement, supported with the defective parts return form which you are now using.

6. Only those service shops authorized by their Motorola Distributor can perform repairs within the warranty period on a no-charge basis to the customer. If you are not already authorized as a Motorola Auto Radio Warranty Service Station, and you are interested in handling this service, please contact your Motorola Distributor for complete details.

### SERVICE NOTES

1. **RADIO POLARITY** - When servicing this radio on the service bench, be sure that the radio housing is connected to the negative side of the power source and that the "A" lead connects to the positive side. If connected otherwise, the radio will not operate and damage to the components will result.

2. **TRANSISTOR REPLACEMENT** - When replacing a transistor, be sure that the transistor contacts are connected as follows: the lead from the driver transformer T-3 to the base terminal; the lead from the output transformer T-4 to the emitter terminal; the collector is automatically grounded when the transistor is mounted to the heat radiator. The schematic diagram shows the position of the transistor electrodes as viewed from the terminal side. Care should be taken when mounting the transistor to the heat radiator;

if not securely mounted, the transistor may be damaged from lack of proper heat dissipation. **NOTE:** When a transistor is replaced, the emitter current should be checked. (See **EMITTER CURRENT ADJUSTMENT**). Replace with transistor type 2N176.

3. **EMITTER CURRENT ADJUSTMENT** - To adjust the emitter current, insert a milliammeter in series with the emitter electrode. This can be done by unplugging emitter lead and connecting positive side of milliammeter to lead, and negative side to transistor emitter terminal. Adjust the variable 500 ohm resistor R-23 for 480 ma emitter current.

4. **TRANSISTOR CHECK** - The transistor used in the radio can be expected to give unusually long trouble free life.

**MOTOROLA INC.** 4545 WEST AUGUSTA BLVD. • CHICAGO 51, ILLINOIS

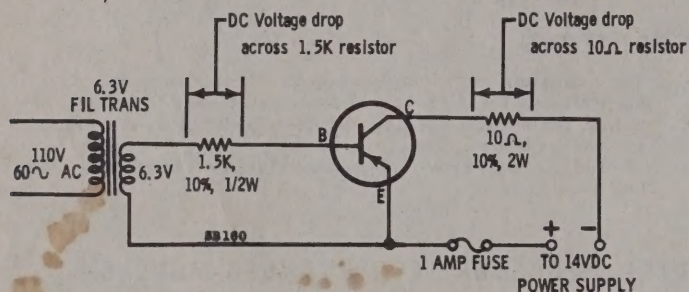


However, transistor checks may be made as follows: a rough check of transistor condition can be made with an ohmmeter. This check primarily measures the ability of the transistor to conduct current in one direction, and to resist current flow in the opposite direction. The resistance in the conduction direction is very low in relation to the resistance in the non-conduction direction. This check is made by connecting the ohmmeter leads as shown in illustration.

A closer check of the transistor condition can be made by constructing the circuit shown from standard parts. Mount the transistor on a heat radiator made of a 1/8 inch thick piece of copper or aluminum, with a minimum area of 40 square inches. (See detail of heat radiator in illustration). Transistor must be securely mounted to the heat radiator; connect transistor into the circuit shown in illustration by using clips - DO NOT SOLDER TO TRANSISTOR. The condition of the transistor is determined by it's gain. The gain should be over 20. To check the gain, proceed as follows:

1. Measure the DC voltage drop across the 1.5K and 10 ohm resistors.
2. Substitute the values obtained into the equation below as follows: divide the DC voltage drop across the 10 ohm resistor by the DC voltage drop across the 1.5K resistor; multiply the results obtained by 110.

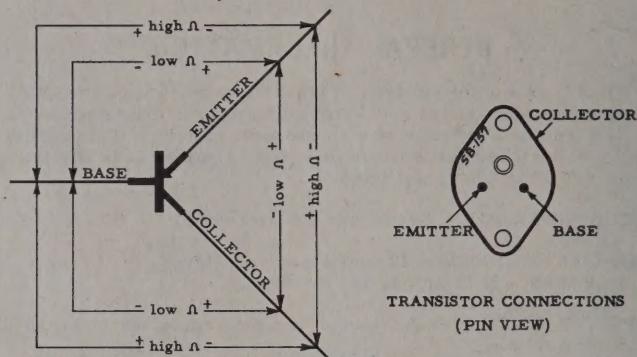
$$\text{GAIN} = \frac{\text{DC voltage drop across 10 ohm resistor}}{\text{DC voltage drop across 1.5K resistor}} \times 110$$



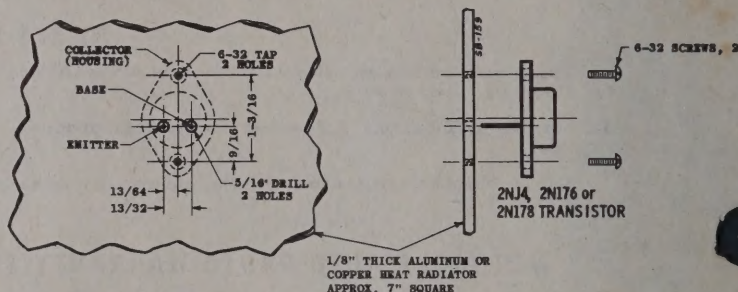
TRANSISTOR TEST CIRCUIT

Substituting a known good transistor for a suspected one is the simplest and most positive way of checking transistors.

5. TUNER REPLACEMENT - If the tuner is replaced and the oscillator trimmer is too loose to peak at 1610 Kc, remove the 400 mmf capacitor (C-19) from ground and connect it to the tie point between the two audio AVC load resistors R-13 and R-14.



TRANSISTOR RESISTANCE CHECK



## ALIGNMENT

Connect an output meter across the speaker voice coil. Set tone to high and volume to maximum. Attenuate signal generator output to maintain 1.79 volts on output meter to prevent overloading the receiver.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	TUNER SET TO	ADJUST	REMARKS
<b>IF ALIGNMENT</b>					
1.	Conv grid (pin 7) .1 mf & thru chassis	455 Kc	Hi end stop	1, 2, 3 & 4	Peak for maximum.
<b>RF ALIGNMENT</b>					
2.	Ant recept through dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
<b>NOTE: Do not perform steps 3, 4, 5 &amp; 6 unless the tuner has been tampered with or components have been replaced. Before proceeding with step 3, back tuning cores 1" out of coils to eliminate their effect on trimmer adjustments. Remove the escutcheon, dial background plate and the pilot light socket to expose the tuning cores.</b>					
3.	Ant recept through dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
4.	"	1200 Kc	Tuner carriage 9/32" from hi end stop	8, 9 & 10	Peak for maximum using alignment tool Motorola Part No. 66A76278.
5.	"	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
6. Repeat steps 4 & 5 until no further increase; then cement tuning cores in place.					
<b>ANTENNA TRIMMER</b>					
7.	-	-	Weak station around 1400 Kc	7	With radio installed in car and antenna fully extended, peak antenna trimmer for maximum.



# REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price	Ref. No.	Part Number	Description	List Price
<b>ELECTRICAL PARTS</b>							
C-1	21A591682	Capacitor, metal mica: 90 mmf 500V...	.20	*43K534281	Bushing, mtg (vol & tuning shafts)....	.15	
*C-2	20K538742	Capacitor, mica trim: 50 mmf to 240 mmf	.45	42B733793	Clip, IF mtg.....	.02	
*C-3	21R120552	Capacitor, cer tub: 22 mmf 500V.....	.25	42K731600	Clip, tube shield.....	.05	
C-4	8R121005	Capacitor, paper tub: .05 mf 200V.....	.25	29K534326	Connector, "A" lead.....	.03	
*C-5	20B536839	Capacitor, 4 in 1 mica: C5A var 7.5 mmf to 90 mmf; C5B 4.7 mmf; C5C var 20 mmf to 180 mmf; C5D 47 mmf.....	.90	15C500666	Cover, bottom (tube side).....	.70	
C-6	8R121005	Capacitor, paper tub: .05 mf 200V.....	.25	15C500663	Cover, top (wiring side).....	1.20	
C-7	21R120567	Capacitor, cer tub: 27 mmf 500V NTC750PPM.....	.25	13D534303	Escutcheon.....	1.60	
C-8	8R121868	Capacitor, paper tub: .01 mf 200V.....	.25	36B534306	Knob, control (dummy).....	.15	
C-9	8R121868	Capacitor, paper tub: .01 mf 200V.....	.25	36K534307	Knob, control (tone).....	.15	
C-10	8R121868	Capacitor, paper tub: .01 mf 200V.....	.25	36B534305	Knob, control (vol & tuning).....	.35	
C-11	8R121005	Capacitor, paper tub: .05 mf 200V.....	.25	2B521332	Nut, clinch (staked to chassis).....	.01	
C-12	8R121568	Capacitor, paper tub: .002 mf 600V.....	.25	2S7087	Nut, speed: 3/32" rnd (dial scale ret)	.01	
C-13	8R121573	Capacitor, paper tub: .1 mf 200V.....	.25	1V534339	Pointer.....	.15	
C-14	8R121005	Capacitor, paper tub: .05 mf 200V.....	.25	38B534308	Pushbutton.....	.10	
*C-15	23A537548	Capacitor, electrolytic: 200 mf 3V.....	1.20	*34B537986	Scale, dial.....	.20	
*C-16	23B536733	Capacitor, electrolytic: 500-100mf/16V	2.05	26A522403	Shield, tube.....	.05	
C-17	8K122076	Capacitor, paper tub: .5 mf 100V.....	.50	9A472148	Socket, ant.....	.25	
C-18	64K530177	Spark Plate.....	.05	9A500709	Socket, pilot light.....	.15	
C-19	21A71872	Capacitor, cer tub: 400 mmf 500V NTC150PPM.....	.65	9C511642	Socket, tube: 7 pin min.....	.15	
E-1	65T533821	Bulb, pilot: 12 volt; #1891.....	.25	*9K538322	Socket, tube: 9 pin min.....	.15	
*E-2	50K537864	Speaker, PM: 6 x 9"; 3.2 ohm VC.....	7.75**	29A76280	Terminal, pin: blk (spkr leads).....	.05	
*L-4	24K537099	Choke, "A" lead.....	.10	29K76282	Terminal, pin: wht (spkr leads).....	.05	
<b>Resistors - NOTE: All resistors are insulated carbon type unless otherwise specified</b>				*39A537234	Terminal, pin (transistor conn).....	.01	
R-1	6R3966	1.5 meg 20% 1/2W.....	.10	4K512467	Washer, felt (control knobs).....	.01	
R-2	6R6038	1500 10% 1/2W.....	.10	39K470032	Wiper, grounding (bot cover).....	.05	
R-3	6R6444	180,000 10% 1/2W.....	.10	<b>MOUNTING PARTS &amp; ACCESSORIES</b>			
R-4	6R5644	82,000 10% 1/2W.....	.10	32D534214	Gasket, spkr.....	.85	
R-5	6R6056	47,000 20% 1/2W.....	.10	64C534094	Plate, spkr mtg.....	.90	
R-6	6R6291	560 10% 1/2W.....	.10	1V534331	Kit, mtg parts (incls items listed below).....	2.15	
R-7	6R6433	2.2 meg 10% 1/2W.....	.10	7B534309	Bracket, receiver mtg.....	.20	
R-8	6R6446	4.7 meg 10% 1/2W.....	.10	7B534215	Bracket, spkr mtg plate: bot.....	.05	
*R-9	6K538716	91 meg 10% 1/2W.....	.20	7B534176	Bracket, spkr mtg plate: top.....	.05	
R-10	6R2118	3.3 meg 20% 1/2W.....	.10	8A4491	Condenser, generator & voltage reg.....	.85	
R-11	6R6075	100,000 20% 1/2W.....	.10	65K16248	Fuse: 9 amp.....	.05	
*R-12	18B536819	Dual Control & Switch: vol 1 meg, tap at 500K; tone 1 meg.....	2.10	4S7688	Lockwasher, int-ext: 5/8 x 1/4.....	.01	
R-13	6R3988	5.6 meg 10% 1/2W.....	.10	4S114693	Lockwasher, int-ext: 7/8 x 1/4.....	.02	
R-14	6R6446	4.7 meg 10% 1/2W.....	.10	4S2620	Lockwasher, int-ext: #10.....	.01	
R-15	6R2118	3.3 meg 20% 1/2W.....	.10	2S2876	Nut, hex: 1/2-28 (mounts radio to dash)	.04	
R-16	6R6407	220,000 10% 1/2W.....	.10	2S2883	Nut, hex: 10-32.....	.01	
R-17	6R6320	10,000 10% 1/2W.....	.10	3S7297	Screw, cap: 1/4-20 x 1/2.....	.04	
R-18	6R5631	120,000 10% 1/2W.....	.10	3S400495	Screw, machine: 10-32 (mounts bot spkr mtg brkt to dash).....	.01	
R-19	6R3927	2.2 meg 20% 1/2W.....	.10	3S7454	Screw, sheet metal: #8 x 1/4 (mounts spkr mtg brkts).....	.01	
R-20	6R5621	10 10% 1/2W.....	.10	6A4141	Suppressor, distributor.....	.30	
R-21	6R5614	56 10% 1/2W.....	.10	<b>TUNER 77K537733 (AT-179) PARTS</b>			
R-22	6R2035	82 10% 1/2W.....	.10	L-1	24K533629	Coil, ant.....	1.70
*R-23	18K537172	Control bias: 500 10% 1W.....	.40	L-2	24K533629	Coil, RF.....	1.70
R-24	6R5683	27 10% 1/2W.....	.10	L-3	24K533628	Coil, osc.....	1.55
T-1	24C485553	Trans, 1st IF: 455 Kc.....	1.45	*77K537733	Tuner, AT-179: complete.....	17.70	
T-2	24K485554	Trans, 2nd IF: 455 Kc.....	1.55			exch 14.15	
*T-3	25B536759	Trans, driver.....	2.15	1K522379	Arm, pointer.....	.75	
*T-4	25C536761	Trans, output.....	3.00	45B531477	Arm, pushbutton extension.....	.30	
*T-5	25B536760	Choke, filter.....	1.40	51A500995	Clutch Drive Assembly.....	2.80	
*	48C124246	Transistor, PNP junction: type 2N176 (replaces 2N174 & 2N178).....		76K533630	Core, iron (osc).....	.30	
<b>MECHANICAL PARTS</b>				76K533627	Core, iron (RF & ant).....	.60	
7B534311	Bracket, dial background.....	.30			Grommet, coil mtg (osc).....		
7B534317	Bracket, dial scale ret.....	.20			Grommet, coil mtg (RF & ant).....		
					Grommet, core mtg.....	.05	
					Shaft, manual tuning: incls bushing...	1.00	
					Shaft, Pinion and Drive Disc Assem.....	.35	
					Sleeve, iron.....	.25	
					Spring, carriage.....	.05	
					Spring, clutch bar return.....	.10	
					Spring, pointer anti-backlash.....	.10	
					Washer, "C" (pointer).....	.01	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE  
 \*New Item, Appears in any List for First Time  
 \*\*Plus Federal Excise Tax at Current Rate

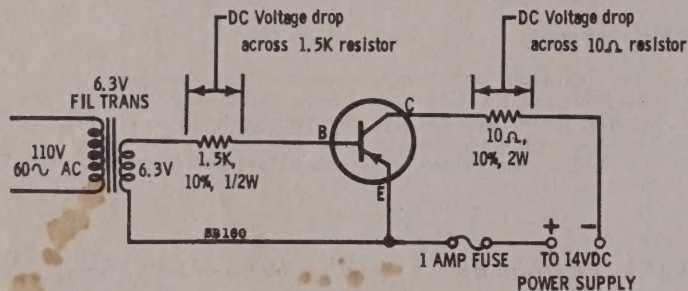


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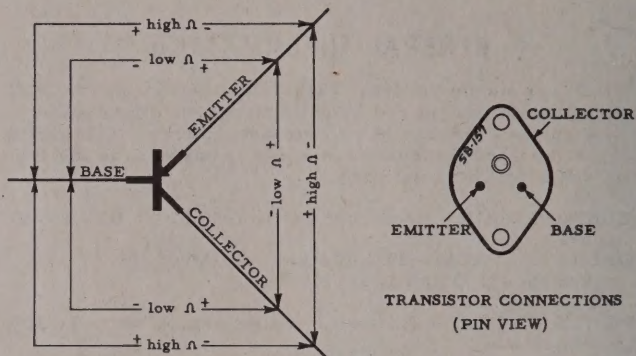
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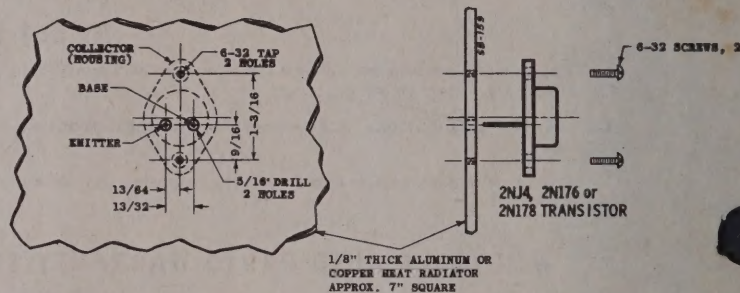
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TRANSISTOR RESISTANCE CHECK



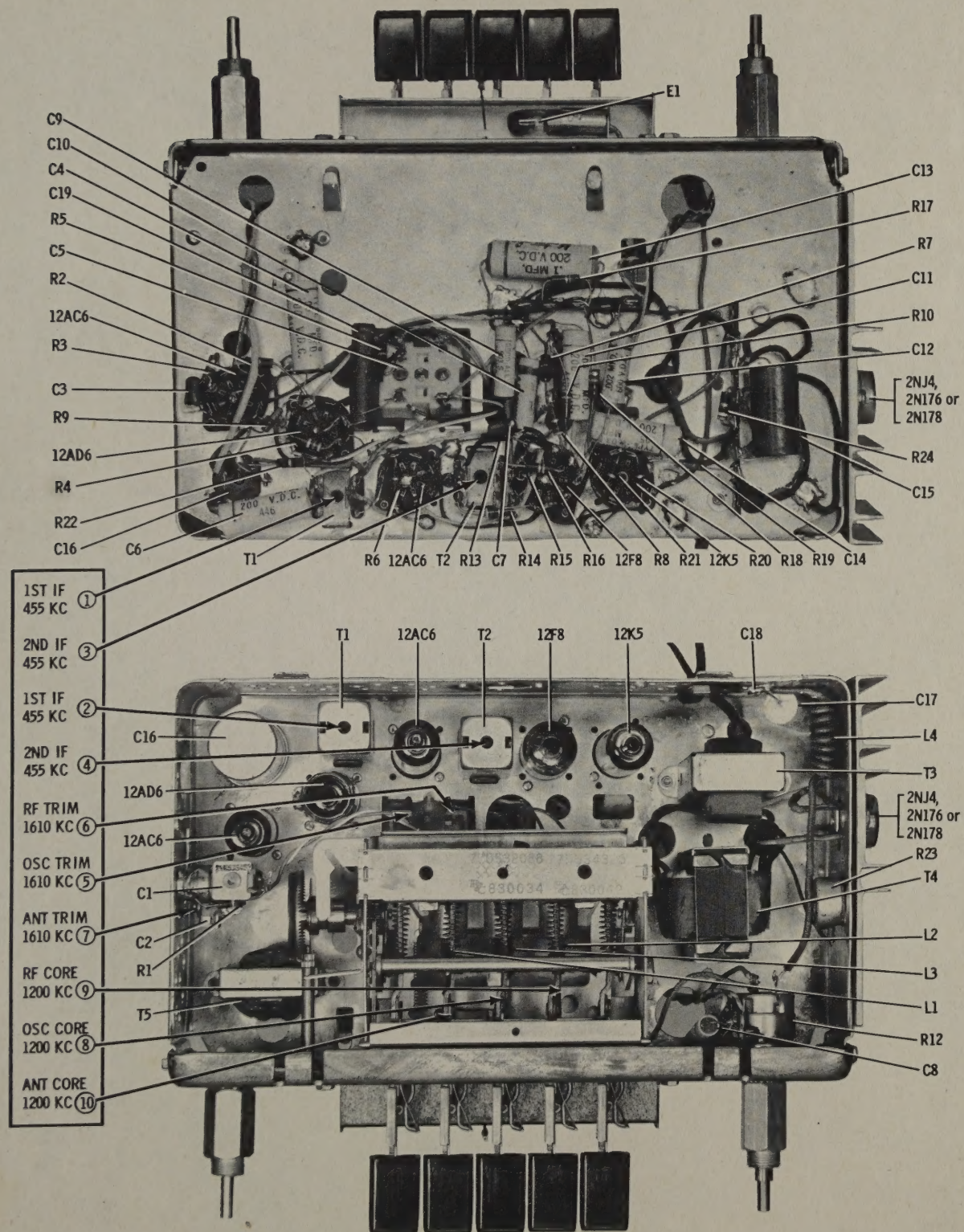
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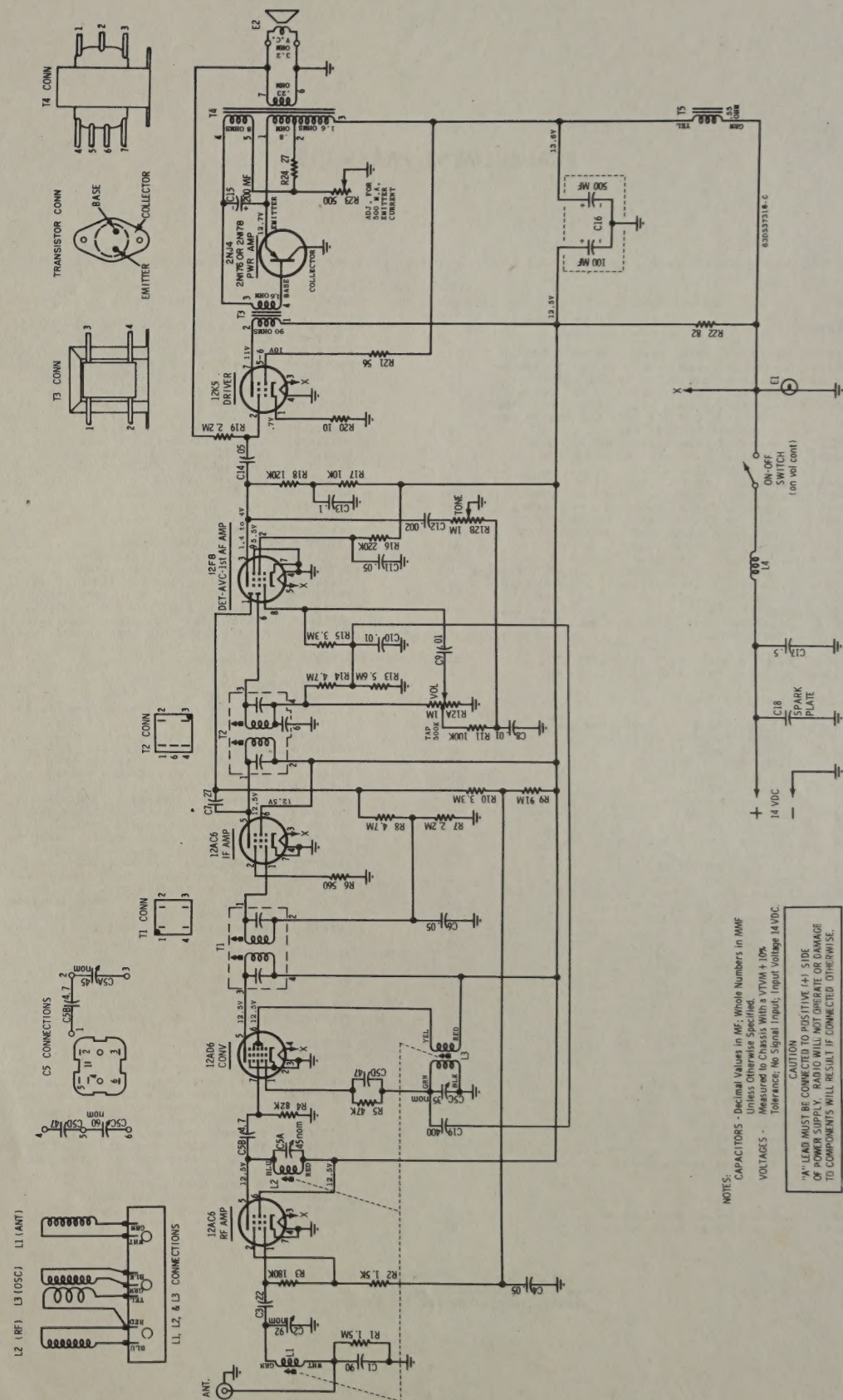
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1.	Conv grid (pin 7) .1 mf & thru chassis	455 Kc	Hi end stop	1, 2, 3 & 4	Peak for maximum.
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NOTE: Do not perform steps 3, 4, 5 & 6 unless the tuner has been tampered with or components have been replaced. Before proceeding with step 3, back tuning cores 1" out of coils to eliminate their effect on trimmer adjustments. Remove the escutcheon, dial background plate and the pilot light socket to expose the tuning cores.					
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ANTENNA TRIMMER					
7.	-	-	Weak station around 1400 Kc	7	With radio installed in car and antenna fully extended, peak antenna trimmer for maximum.



## DUMMY ANTENNA



### ALIGNMENT ADJUSTMENTS AND PARTS LOCATION



NOTES:

CAPACITORS - Decimal Values in MF: Whole Numbers in MMF Unless Otherwise Specified

VOLTAGES - Measured to Chassis With a VTVM  $\pm 10\%$  Tolerance; No Signal Input; Input Voltage 14 VDC.

CAUTION

"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE OR DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

### MODEL CTA6T SCHEMATIC DIAGRAM





10000-00-0000

